

# IES Newsletter

Volume 12, Number 4  
July - August 1995

## Director's Note

IES scientists have served as mentors in the National Science Foundation-funded Research Experiences for Undergraduates Program (pages 2-3) for eight years. During this time, 74 college students — primarily those about to begin their junior or senior years — have spent their summers here doing independent ecological studies of their own design.

The program's coordinators survey former participants to learn how the program may have affected their career choices. Responses to a 1993 questionnaire showed that a majority of the students from the 1988-1992 programs were working toward advanced degrees in science or medicine. Several chose careers as scientific librarians, as educators and as environmental consultants. Some students were as yet undecided. A second survey is about to be sent to all alumni for more detailed statistical analysis.

In today's rapidly changing world there is a great need for well-trained scientists. We are proud of the role IES plays in supporting and encouraging the scientific interests of so many young people.

The IES Newsletter is published by the Institute of Ecosystem Studies, located at the Mary Flagler Cary Arboretum in Millbrook, New York. All newsletter correspondence should be addressed to the editor.

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## Dr. Likens Wins Top Awards

In mid-summer, Dr. Gene E. Likens, Director of the Institute of Ecosystem Studies, received the world's highest award for limnology as well as the Ecological Society of America's most coveted prize.

Late in July, Dr. Likens traveled to São Paulo, Brazil to attend the 26th Congress of the International Association for Theoretical and Applied Limnology. There, at the closing ceremonies, Association President Professor Dr. Pétur Jónasson awarded him the Einar Naumann-August Thienemann Medal and told the audience that "this is the highest international honor bestowed upon a limnologist". The medal, awarded only every three years, is given to scientists who have contributed greatly to the development of limnology, which is the scientific study of the physics, chemistry, geology and biology of inland waters. The citation for Dr. Likens stated that the award was "for his profound contributions to the fields of nutrient cycling and biogeochemistry, particularly for his seminal research in land-water relationships and for his extraordinary leadership in the promotion of ecosystem science".

Several days later, on August 1, Dr. Likens attended the 80th annual meeting of the Ecological Society of America (ESA) and received the Society's 1995 Eminent Ecologist Award for outstanding contributions to the science of ecology. Sharing the award was Dr. F.H. Bormann, Emeritus Professor of Forestry and Environmental Studies at Yale University; Drs. Likens and Bormann are co-founders of the Hubbard Brook Ecosystem Study. In presenting the award, ESA President Dr. Judy Meyer said that what Drs. Likens and Bormann have accomplished and fostered at Hubbard Brook "epitomizes the concept of a sustained and distinguished contribution" to ecology and biological science. The Eminent Ecologist Award is given to senior scientists whose work meets this criterion.

Among the approximately 2,300 attendees at the ESA meeting were 19 scientists and educators from the Institute as well as four members of the IES Board of Trustees.



PETER KLOSE

*Dr. Likens traveled to Brazil and Utah from the White Mountains of New Hampshire, where he spends each summer working at the Hubbard Brook Experimental Forest. This forest is the site of the Hubbard Brook Ecosystem Study (HBES), an ecological research program that he and three colleagues — Dr. F. Herbert Bormann (see text), and Dr. Robert S. Pierce (U.S. Forest Service) and Dr. Noye M. Johnson (Dartmouth College), both of whom are deceased — developed in 1963. HBES quickly became a model for long-term ecosystem research and currently is a field site for studies by dozens of investigators and their students. Among Dr. Likens' many on-going HBES research projects are a long-term study of the biogeochemistry of calcium in forest watersheds and associated aquatic ecosystems — the project recognized by the ESA's Eminent Ecologist Award — and a study to determine if the chemicals replacing chlorofluorocarbons are environmentally safe. In addition, he supervises the laboratory and field work of his graduate students.*

*Here, Dr. Likens stands by a precipitation collector, one of his research tools at Hubbard Brook.*



# Total Immersion in Research and Research-in-Context for Summer Students

For most of their lives, students learn science as passive consumers of the fruits of others’ efforts. The Institute’s Research Experiences for Undergraduates (REU) Program gives students a chance to be producers of ecological knowledge. Funding from the National Science Foundation (NSF)\* since 1988 and the Andrew W. Mellon Foundation since 1994 allows students to become integral parts of the IES community each summer to conduct independent research in ecology.

The IES program goes beyond hands-on research, emphasizing other dimensions of the scientific enterprise as well. Through discussions and seminars, students learn how to ask good questions, design successful studies, make convincing presentations and write effective papers. Program directors Drs. Alan Berkowitz, Stuart Findlay and Steward Pickett, together with REU coordinator Ms. Stephanie Shoemaker and the scientist mentors, make the social construction of knowledge a part of the REU student experience. The group also explores the broader contexts — socio-economic, intellectual, political, ethical and personal — within which research takes place. Finally, the REU group probes the issue of diversity — of research style, disposition and background — to gain a deeper sense of the benefits it brings to the scientific enterprise and the challenges we all face in fostering such diversity.

The three-month program begins late in May. In 1995, 220 college undergraduates from across the country applied for the 10 REU internship positions at IES. Eight of the recipients were supported by the NSF grant, and a donation to the Institute by The Andrew W. Mellon Foundation, through its Minority Undergraduate Fellowship Program, supported two additional students. Also in 1995, supplemental grants from NSF and The Andrew W. Mellon Foundation supported Dr. Charles H. Nilon as a fourth program director.

### Dr. Nilon: Scientist and Mentor

Good role models are important, especially in a program that aims to reinforce and strengthen a young person’s resolve to tackle a challenging career in science. As

\* The goal of NSF in developing the REU program was to improve science education in the U.S. and to help assure an adequate supply of top-notch scientists, mathematicians and engineers for the future. Many institutions compete for annual NSF funds to support REU students, and consistently IES has been among the recipients.

the REU student body increased in diversity over the past eight years, the project directors realized a need to increase the diversity of the project leaders. Position announcements for a visiting scientist were sent to scientific colleagues nationwide, and Dr. Charles Nilon, associate professor of wildlife management at the University of Missouri-Columbia, was selected.



Dr. Charles Nilon (left), one of the 1995 Research Experiences for Undergraduates Program directors and mentors, and his REU student Erik Peterson studied small mammals and vegetation structure in oak forests. Here they are identifying herbaceous plants growing in a square meter of forest on the Arboretum’s Tea House Hill.

During Dr. Nilon’s stay at the Institute, he was involved both in his own research and with the REU program. His research interests lie in the area of urban ecology, specifically how mammals, primarily, but also some reptiles and amphibians, use habitat patches in cities. His existing research plots are in New York City, Kansas City, Chicago and Columbia, Missouri. While at IES, he not only set up additional grids in New York City but also established grids in the Institute’s forests and at Fordham University’s Calder Ecology Center in Armonk, N.Y. At these sites he studied how the numbers of small mammals relate to vegetation structure and composition. In the New York City plots, he found six mammal species. The white-footed mouse was by far the most common, comprising 60-75% of all captures, followed by chipmunks and gray squirrels; short-tail shrews, meadow voles and the southern flying squirrel were present in smaller numbers. The City Parks Foundation has noted a high amount of seed and seedling predation, and Dr. Nilon is trying to learn more about whether the urban mammals he studies are responsible.

In his position as an REU project director, Dr. Nilon put on his educator’s hat. At the University of Missouri, he is involved with the McNair Program, a U.S. Department of Education initiative designed to encourage low-income, first-generation college students to continue on to graduate school and Ph.D. programs in science and social science. He brought his experience with this

and other projects involving students in science to his work in the IES REU program. He organized and moderated one of the regularly scheduled Research-in-Context afternoon workshops for REU students, discussing “Diversity in the Scientific Community”. And he still had time to be a mentor — a scientific advisor and collaborator — for Mr. Erik C. Peterson, an REU student from Fordham University, Bronx, N.Y. (see box).

### The Students

REU students work independently in collaboration with a scientific mentor, designing their own studies, doing field and/or laboratory research and analyzing results. In late August they present their findings at a symposium attended by Institute staff and members of the public. Final reports are published by the Institute as an IES Occasional Publication.

Research is not the only learning opportunity the students enjoy during their summer at the Institute. At a mid-summer Forum on Opportunities in Ecology, REU Program

participants, together with students from nearby colleges and universities, meet with professionals from science-related fields. This program offers an opportunity to experience vicariously the challenges and rewards of careers in academia, museum curatorship, field research, science writing, education, consulting, industry, city government, environmental research and environmental law, among others.

This year, for the third time, REU students became teachers-for-a-day, working with at-risk high school students through the Liberty Environmental Science Academy (a joint program of Bank Street College of Education, New York City and Bard College, Annandale, N.Y.), and demonstrating their research at field sites around the Institute. Weekly REU seminars focused on Research Strategies, about scientific methods, theory, etc., and Research-in-Context, designed to help students put their own research into the broader perspective of the discipline of ecology, the scientific community and society in general.

### Research-in-Context Series: Case Study, New York City Water Supply

One component of the 1994 and 1995 REU Research-in-Context series was a case study to engage the students in considering the interface between ecological research, public policy and social concerns. The students were confronted with New York City’s water dilemma: it is the only city in America with a population of over one million that does not need to filter its drinking water. However, if the city’s water fails to meet new Environmental Protection Agency standards, the water will have to be filtered at a cost of approximately \$6 billion to build a new filtration plant plus \$300 million in annual operating expenses.

The students were asked to consider what the different perspectives on the issue might be and whom they would like to hear from in considering the science/society interface in this matter. Representatives invited to a panel discussion included Ms. Deborah DeWan from The Catskill Center; Mr. J. Wolfe Tone from the New York City Department of Environmental Protection; Mr. Dick Coombe, chairperson of the Whole Farm Program; and Dr. Peter Groffman from IES. Together, they addressed a series of questions covering all sides of the water issue.

At the final meeting, students considered ways that ecological research influenced and was influenced by the unfolding New

York City water supply issue. After a lively group discussion of the points about which the students were most excited, sub-groups produced written statements summarizing students’ views on the key issues. The combined statement will be included in the IES Occasional Publication reporting research findings of the 1995 REU Program.

1995 REU students and their individual research projects were:

- Anna E. Arreola (Stanford University, Stanford, Ca.): *A comparison of denitrification among three vegetation types in a freshwater marsh.* **Dr. Peter M. Groffman**, mentor.
- Dawn Berggren (Univ. of Florida, Gainesville, Fl.): *Leaf development and consumer attack: An analysis of field patterns.* **Dr. Clive G. Jones**, mentor.
- Amy Burtelow (Douglass College, Rutgers Univ., Brunswick, N.J.): *Short and long term effects of earthworms on denitrification in the forest floor.* **Dr. Patrick Bohlen**, mentor.
- Melissa R. Finn (Fairfield Univ., Fairfield, Ct.): *The effect of submerged aquatic macrophytes on sediment porewater chemistry.* **Drs. Cathleen Wigand and Stuart E.G. Findlay**, mentors.

- Rima B. Franklin (Bard College, Annandale-on-Hudson, N.Y.): *An examination of food web dynamics: Does carbon availability affect species abundance in the hyporheic zone of a small stream?* **Dr. Stuart E.G. Findlay**, mentor.
- Heather M. Hill (Clark Atlanta Univ., Atlanta, Ga.): *Small mammal tree-seed predators along forest edges.* **Dr. Richard S. Ostfeld**, mentor.
- Phoebe J. Lam (Massachusetts Institute of Technology, Cambridge, Ma.): *The effect of food quality on growth and reproduction of zooplankton.* **Drs. Nina F.M. Caraco and Michael L. Pace**, mentors.
- Rachel H. Levine (Wesleyan Univ., Middletown, Ct.): *Responses of Viburnum acerifolium (maple leaf vibernmm) and Ostrya virginiana (American ironwood) to intact edges, thinned edges and gaps.* **Dr. Steward T.A. Pickett**, mentor.
- Erik C. Peterson (Fordham Univ., Bronx, N.Y.): *Species composition of the herbaceous vegetation along an urban-to-rural gradient.* **Dr. Charles H. Nilon**, mentor.
- Beth L. Sparks (Juniata College, Huntingdon, Pa.): *The effects of low dissolved oxygen on juveniles of Elliptio complanata, a freshwater clam.* **Dr. David L. Strayer**, mentor.

*Applications for the summer 1996 REU Program are now available. Deadline for application is February 15, 1996.*

## REU Research: Oak Forests Get Special Attention

Mr. Erik Peterson designed his REU study to pursue his interest in forests. He chose to investigate how the species composition of groundlayer vegetation — specifically herbaceous plants under one meter in height — differed from the city to rural areas. To accomplish this, he chose oak stands that were being studied both by scientists involved in the Institute’s Urban-to-Rural Gradient Ecosystem Study and by Dr. Nilon and his University of Missouri graduate student Ramona Weidel. His research sites were Inwood Hill Park in Manhattan, N.Y. (urban), the Calder Ecology Center (suburban) and IES (rural).

Previous studies of forest canopy trees have found that the proportion of native species to exotic (non-native) species is lower in urban forest stands and higher in rural stands. Mr. Peterson sampled all vegetation under one meter in height at each of 75 one square-meter quadrats at the three sites along the gradient for a total of 225 samples. He found that while there was no significant difference in the numbers of exotic species at urban and rural sites, the

number of native species, as seedlings, was significantly higher in the urban forests. An explanation for this finding in light of what has been learned previously about canopy species is pending further research.

Previous studies at Inwood Hill Park suggest that the canopy species — primarily oak — are not regenerating. Mr. Peterson had selected oak stands for his research to learn if this situation extended across the gradient, and found that, indeed, oak trees are not doing well. While two of the three IES sampling grids showed oak regeneration (i.e., oak seedlings were well represented in the square-meter quadrats), one did not, and none of the grids in New York City or at the Calder Ecology Center showed signs of oak regeneration. (Mr. Peterson noted that the latter site had very little ground-level vegetation at all, and hypothesized that this was due to a no hunting policy that has resulted in over-browsing by deer.)



## Calendar

### CONTINUING EDUCATION

Winter/Spring semester catalogues are being sent to all IES members and Continuing Education Program students in mid-December. Copies also will be available at the Gifford House. The winter semester begins during the third week of January. Early winter classes and workshops include:

#### *Landscape Design*

Jan. 17 (7 sessions): **Graphics**

Jan. 30 (6 sessions): **Principles of Landscape Design**

#### *Gardening*

Jan. 18 (6 sessions): **Commercial Greenhouse Management**

Jan. 20: **Ornamental Grasses in the Garden**

Feb. 3: **Hows of Houseplants**

Feb. 3: **Developing Ecologically-Sound Nursery and Landscape Practices**

Feb. 5 (6 sessions): **Fundamentals of Gardening**

#### *Workshops*

Feb. 4: **Perennials in the Mixed Border**

#### *Other Courses*

Jan. 20: **Astronomy of the Winter Skies**

Jan. 27: **Buds and Bark: Winter Tree Identification**

Call 914/677-9643 for information.

### SUNDAY ECOLOGY PROGRAMS

Free public programs are held on the first and third Sunday of the month, except over holiday weekends. (No programs are scheduled for January.) Last-minute changes are sometimes unavoidable, so call 914/677-5359 to confirm the day's topic. In case of poor weather, call 677-5358 after 1 p.m. to learn the status of the day's program. The following programs begin at 2 p.m. at the Gifford House, except as otherwise noted\*:

Feb. 4: **Echoes of the Ancient Skies**, a program for children and their families (\* to be held at the IES auditorium)

Feb. 18: Holiday weekend (no program)

### Sunday Ecology Programs, continued

Mar. 3: **Human Accelerated Environmental Change**, a presentation by Dr. Gene E. Likens (\* to be held at the IES Auditorium)

### IES SEMINARS

The Institute's program of free scientific seminars features presentations by visiting scientists each Friday at 3:30 p.m. at the IES Auditorium:

Jan. 12: To be announced

Jan. 19: Topic: **Interaction strength in terrestrial food webs**. Speaker: Dr. Oswald Schmitz, School of Forestry and Environmental Studies, Yale Univ.

Jan. 26: Topic: **Adaptive sampling techniques**. Speaker: Dr. Steven K. Thompson, Penn State Univ.

### VOLUNTEER OPPORTUNITIES

The IES Volunteer Program is looking for enthusiastic women and men interested in working with Institute staff for a few hours (or more) each week at the Gifford House Visitor and Education Center. The wish list includes salespeople in the Gift and Plant Shop; gregarious individuals to greet visitors and assist with public education programs; and those whose organizational abilities help to make office work go more smoothly. For information on responsibilities and benefits, call Su Marcy, IES volunteer coordinator, at 914/677-5359.

### GREENHOUSE

The IES greenhouse, a year-round tropical plant paradise and a site for controlled environmental research, is open until 4:00 p.m. daily except public holidays. Admission is by free permit (see "Hours").

### IES HOME PAGE

The Institute is on the World Wide Web. Visit the IES home page at:

[www.marist.edu/~ies/](http://www.marist.edu/~ies/)

Note: With some software, you may need to use:

<http://www.marist.edu/~ies/>

### HOURS

Winter hours: **October 1 - April 30**

Closed on public holidays.

Roadways are closed when snow-covered.

Public attractions are open Mon. - Sat., 9 a.m. - 4 p.m. & Sun. 1 - 4 p.m., with a free permit.

The IES Gift and Plant Shop is open Mon.- Sat., 11 a.m. - 4 p.m. & Sun. 1 - 4 p.m. (The shop is closed weekdays from 1 - 1:30 p.m.)

Note: The Shop will close at 3 p.m. on Sunday, December 24 and on Sunday, December 31.

• All visitors must pick up a free permit at the Gifford House Visitor and Education Center on Route 44A for access to IES public attractions. Permits are available until 4 p.m. daily.

### IES GIFT AND PLANT SHOP

January Sale: Discounts all month!!

New in the Shop ... poinsettia and wildflower sweatshirts ... IES sweatshirts in great new colors ...

1996 nature calendars (bats, butterflies, frogs, songbirds and many more) ... Sierra Club holiday card sets ... for children ... animal finger puppets ...

Peterson's First Guides ... nature games ... and in the Plant Shop ... holiday plants ... cacti ... pruners, trimmers and knee pads for gardeners

Senior Citizens Days: 10% off on Wednesdays

### MEMBERSHIP

Become a member of the Institute of Ecosystem Studies. Benefits include a member's rate for IES courses and excursions, a 10% discount on Gift Shop purchases, a free subscription to the IES Newsletter and participation in a reciprocal admissions program, with benefits at over 100 nature centers, forest preserves, gardens and conservatories in the U.S. and Canada. Individual membership is \$30; family membership is \$40. For information, call Ms. Janice Claiborne at 914/677-5343.

The Institute's Aldo Leopold Society: In addition to receiving the benefits listed above, members of The Aldo Leopold Society are invited guests at spring and fall IES science updates. Call Ms. Jan Mittan at 914/677-5343 for information.

For general information, call the IES Education Program Office at the Gifford House Visitor and Education Center: 914/677-5359 weekdays from 8:30 a.m. - 4:30 p.m.

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Volume 12, Number 4  
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